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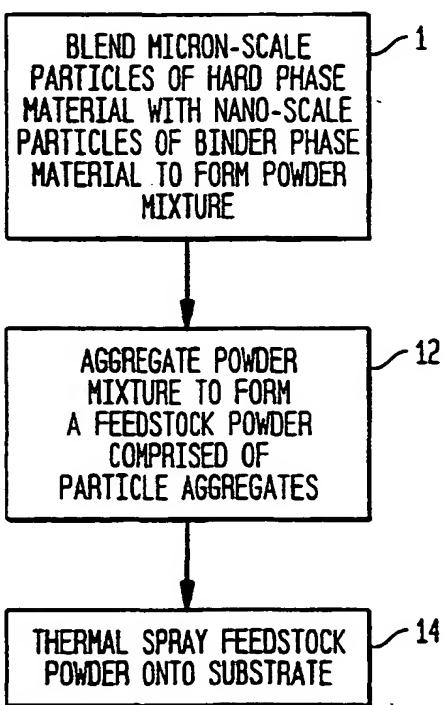
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(54) Title: MULTIMODAL STRUCTURED HARDCOATINGS MADE FROM MICRO-NANOCOMPOSITE MATERIALS



(57) **Abstract:** A thermal spray method for the fabrication of ceramic/metal and ceramic/ceramic hardcoatings for wear applications. The method makes use of feedstock powder, composed of micron-scale aggregates of hard phase material particles that are either mixed or coated with a readily fusible nano-scale binder phase material (12). Thus, during thermal spraying (14), the nanostructured material undergoes rapid melting while the aggregated material is heated but not necessarily melted. A dense coating is formed when the molten nano-material fills the available pore spaces between the heated and softened aggregates, providing a strong and tough matrix for the consolidated material. Optimal wear properties are achieved when the volume fraction of aggregated particles is high, typically in the range 0.5-0.9. Aggregated material may be composed of one, two or more particles of different sizes and/or compositions, with particle size distribution that gives high packing density for the hard phase.



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